

# **Compucolor® Corporation**

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C O L O R C U E

\$1.00

Readers --

We have an exciting tournament planned for the West Coast Computer Faire in San Francisco. The Faire takes place on Friday, Saturday and Sunday, May 11-13, and in addition to our well-staffed booth, we will be staging the first official 'Challenge the COMPUCOLOR' Othello tournament. Othello is immensely popular all over the country, and various local competitions are held throughout the year. These are played using the standard Othello board and chips, but for the upcoming tournament, players will be eliminated by the COMPUCOLOR II, instead of by one another. The tournament is sponsored in association with CBS toys, owner of the board game, and there will be prizes of all kinds in addition to the fun and excitement of play. We hope that all of you in the San Francisco area will turn out for this competition, if not to play, then simply to watch. And if you think that you can beat the COMPUCOLOR II with one hand tied behind your back, think again! We have a new, super-duper, street-wise version of OTHELLO that we'll be using for this competition. We may release it later on a Sof-Disk. Stop by our booth for information about our latest products and displays. You can meet some of the Compucolor people with whom you've corresponded, and remember that our area dealers will be there with special demonstrations of their own.

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We've enclosed a special pass for those of you who plan to attend the NCC (National Computer Conference) in New York city in June. The NCC is considered by many to be **the** most important show of the year, and its draws visitors from all over America. (Many international attendees, too) This pass will get you into the show as our guest absolutely **FREE**. (a \$25.00 savings) But not only that, it will obviate any waiting in line. Please note that you must fill out the form and mail it before May 15. You will get your badge by return mail, so send it in without delay. See you there!!

We're sorry about the absence of the usual colorful top border on our ColorCue front page. We've exhausted our entire supply of 'NEWS' paper and are in the process of designing some new ColorCue stationery. If you have any artistic suggestions, send them to us. We hope to get new stationery soon, but in the meantime, pardon our un-colorful appearance.

## ASSEMBLER ERROR CODES

The Assembler Sof-Disk, and its companion, the Text Editor, allow you to come up with some unique programs for your COMPUCOLOR II that are faster and more flexible than similar BASIC programs would be. Many people who are using the Assembler have reported great success in completing some interesting applications. Bill Greene, of Byron, Georgia, says that he has enjoyed using the Assmbler, and that it has expanded his machine's capabilities by quite a bit. Bill taught himself Assembly Language in a very short period of time, which is pretty terrific in itself! He's made a couple of nice contributions to the Users Library, and we're hoping to get a good article for ColorCue from him in the near future. For Bill Greene and all the other Assembler owners, we've published below a list of all the Assembler Error Codes. Somehow, these were left out of the Assembler Manual, and Assembler users have been getting two-character messages with no way to interpret them!! We will be certain to include these codes in the next printing of the Manual, of course, but in the meantime, accept our apologies and refer to the list below. These errors during the assembly will be indicated by a code in column one of the listing line.

- A - Ambiguous reference: reference to a multiply-defined symbol
- B - Expression error: an invalid expression was encountered
- F - Format error: invalid syntax.
- I - Invalid number encounterd in an expression
- M - Multiply-defined label or symbol
- O - Invalid opcode encountered.
- P - Phase error: Label or symbol has different value on pass 2 than on pass 1
- R - Invalid register specified enoutered.
- T - Symbol table overflow (insufficient RAM)
- U - Reference to an undefined label or symbol encountered
- V - Overflow during expression evaluation
- Z - Missing end statement

## ARTS AND CRAFTS DEPT.

### Dust Cover

The following article was submitted by Bob Bennett of Anchorage, Alaska. This non-programming piece is something a little different for ColorCue, and we appreciate Bob's sending it in.

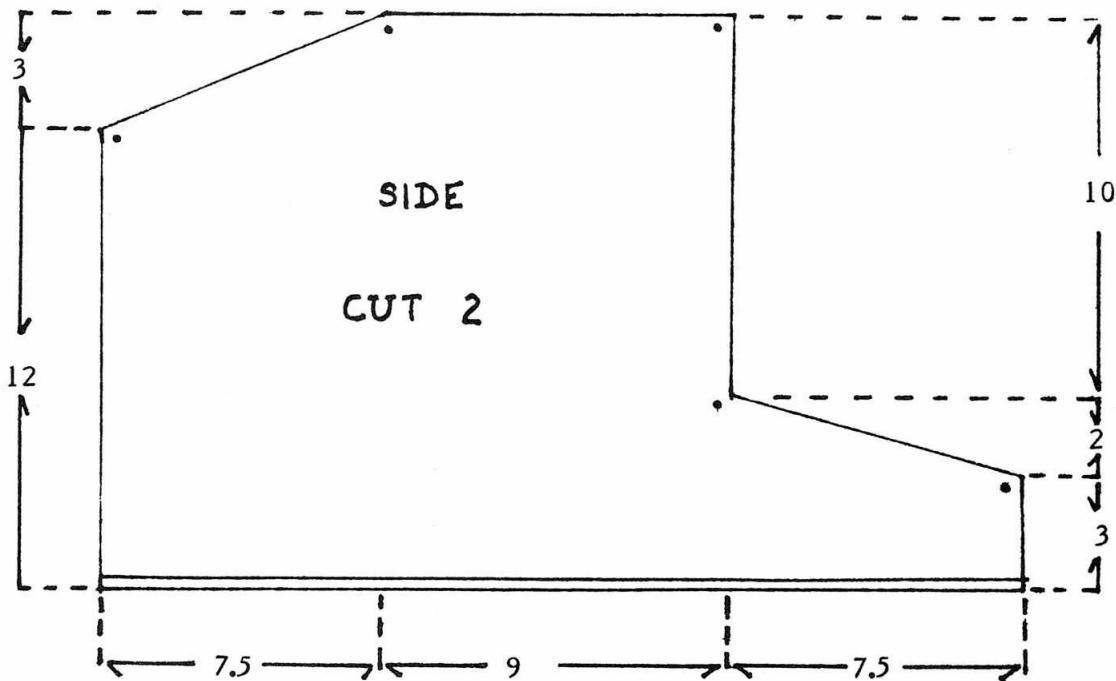
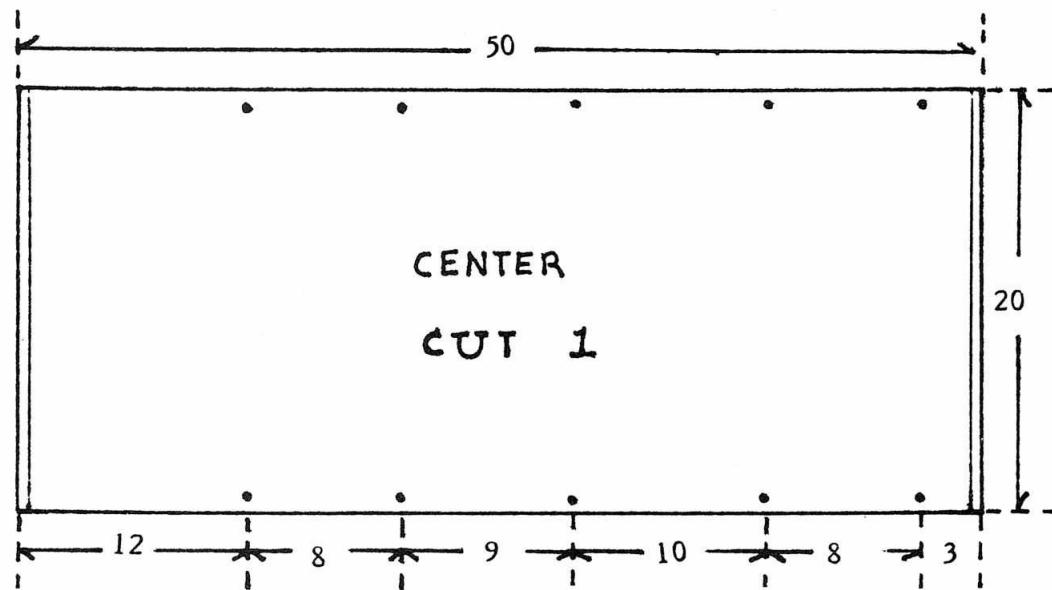
Here's a neat idea for you COMPUCOLOR II owners who can wield a needle and thread -- a dust cover for your computer. The COMPUCOLOR II, designed for use in the home environment, is subject to a wide variety of ills which would worry even the largest of computers. Most homes, for instance, have no air conditioning, air filtration system, or humidifying controls. In the absence of such environmental controls which larger computers are protected with, the COMPUCOLOR II can be protected with a homemade dust cover. The sewing pattern for such a dust cover is found below. When constructed of nylon or other water resistant material, this cover not only protects the keyboard and computer from dust, but also gives some protection against other accidents such as spills, leaking roofs, etc. when the machine is not in use. The cover is made of three pieces which when sewn together form a pleasing and functional cover for the COMPUCOLOR II.

To protect and extend the life of your computer, this cover can be placed over both the keyboard and the monitor after each session.

When putting the dust cover together, note that all seams are a standard 5/8 inch, and there is a 5/8 inch hem allowance at the bottom. The long edge of the center piece is stitched to the edge of the side-panel represented by a single line. All double lines denote an edge to be hemmed. To make construction easier, mark each long edge of the center piece with tailor tacks or chalk at the intervals shown. Mark the corresponding dots of each side piece. Pin, matching dots, and stitch. Clip seams at corners. If you use a washable fabric, be sure to wash it first to reduce shrinking.

Fabric Requirements: 1 1/2 yards @ 45"      1 yard @ 60"

Fabric Suggestions: denim, duck, (treat with ZEPEL) or any tightly woven nylon fabrics.



## KEEPING IT SIMPLE

### Generating Keywords

The Deluxe and Extended keyboards allow you to save keystrokes when programming because they have special command and function keys which print out BASIC keywords. Many of these codes can be simulated on the standard keyboard. Carl Hennig, of the University of Waterloo, in Ontario, Canada, has prepared the following list of codes that can be used to generate keywords. Many keywords are generated by pressing the CONTROL key at the same time as a character. These operate in the same way on all keyboards. All characters that are not preceded by CTRL use the COMMAND key. This can be simulated on the Standard keyboard by pressing the 'SHIFT' and 'CONTROL' keys simultaneously.

ABS	CTRL 0	NEXT	B
AND	9	NOT	2
ATN	,	OUT	P
CALL	CTRL 1	PLOT	R
CLEAR	Y	POKE	U
CONT	X	POS    CTRL	4
COS	CTRL 9	PRINT	V
DATA	C	PUT	Q
DEF	Z	READ	F
DIM	E	REM	N A7 ON
END	@	RESTORE	K ERASE LINE
FILE	G	RETURN	M RETURN
FN	_ (CRT)	RND    CTRL	6
FRE	CTRL 2	RUN	I TAB
GET	O	SAVE	S
GOSUB	L ERASE PAGE	SGN    CTRL	.
GOTO	H HOME CURSOR	SIN    CTRL	:
INP	CTRL 3	SPC(	0
INPUT	D	SQR    CTRL	5
INT	CTRL /	STEP	3
LEN	>	STR\$	/
LIST	W	TAB(	FG ON
LOAD	T	TAN    CTRL	;
LOG	CTRL 7	THEN	1
		WAIT	ESC

Since you can generate all of these codes on the Standard keyboard, why get the Extended or Deluxe keyboard? The Deluxe keyboard has some special function keys whose codes can only be generated by the Standard keyboard if you are in Plot Mode. In any other mode, only the Deluxe keyboard has this capability. As for the Extended keyboard, it really saves in keystrokes, and all of you midnight hackers know how much trouble it is to hit two keys instead of just one. We also recommend the Extended or Deluxe keyboards since they make the colors easier to learn and use. And anyone using the COMPUCOLOR II for accounting purposes (or even for the Checkbook program) will appreciate the convenience of the number pad!

## ADVANCED APPLICATION

### Linked Lists, Part II

We've gotten many appreciative remarks about A. E. (a.k.a. 'AI') Williams' article on Linked Lists which appeared in last month's ColorCue. Here's the second part of that article, which completes the introduction to this topic. Again, our thanks to AI for his time and energy!

### LINKED LISTS (Part II: Improved Linked Lists)

Part I (March, 1979, ColorCue) discussed the concept of sequencing a file on a key logically, rather than physically, by using a "link field" in each record to show the physical location of the next record. This article will highlight some improvements to the basic techniques, noting exactly what is improved and how.

One problem with the basic routines given in Part I is that deleted records are kept as part of the record chain. This means that they will be re-read every time the file is retrieved sequentially, requiring extra processing time for no useful product. Moreover, they take up file space which could be used for other records, perhaps leading to requirements for more frequent file reorganizations.

Let's consider these two problems one at a time. Once again, the link field comes to our rescue in solving the first difficulty. We simply must save the record address of the last record retrieved in logical sequence (i.e., retrieved by link rather than physical sequence) before the record to be deleted (which will also be the physically previous record if its link field was zero.) If the link field of the deleted record is zero, we set the link field of the record whose number we save to the record number of the deleted record plus 1. If the deleted record's link is nonzero, we move it to the link field of the preceding logical record (whose number we saved.) You can see that, in either case, the deleted record is removed from the logical chain, eliminating the need to process it in reading the file sequentially, since following the link of the preceding logical record will cause the deleted record to be skipped.

For example, consider the file pictured in the following diagram:

dummy	17	5	B	2	6	D	3	0	E	4	-1	A	5	2	C	6	3	open
rec#	1			2		3		4		5		6		7				

a. File before deletion of record D

dummy	17	5	B	2	6	del.	3	0	E	4	-1	A	5	2	C	6	4	open
rec#	1			2		3		4		5		6		7				

b. File after deletion of record D

To delete record D, we read the file sequentially by link (i.e., by ascending key) saving the FCS record number of the last record read prior to each new GET, until we reach D. At this time the saved record number should be 6, corresponding to record C. (If you don't understand why this is so, please review Part I of this article.) Because the link field of the deleted record, D, is zero, we merely add 1 to the FCS record number of the deletion, giving 4. This value is plugged into the link field of record 6, the record whose number we saved because it was retrieved last. Had the link field of D been nonzero, we would have moved it to record 6's link field instead. Since no record points to record 3 any longer, it will never be retrieved.

Notice that we could have avoided the need to save the number of the last logical record if each record had, in addition to its normal forward link, a "backward" link pointing to its logical predecessor. Files so structured are called two-way linked lists. Notice also, however, that two-way linked lists are harder to build, and require us to retrieve more records to make additions and deletions, since we must also update the forward link of the record preceding and the backward link of the record following (as well, for additions, as both link fields in the record being added.)

So far, so good--we've eliminated needlessly reading deleted records. Now how about reclaiming the space they take up?

We can do this by building a separate linked list (called the free list) from all the unused record spaces when the file is created; that is, we zero the link fields in all unused records except the last, which we give a negative value to denote "end of list." We now interpret the "first available record" field on the dummy as a free list pointer, containing the number of the first record on the free list.

When a record is deleted, we simply add it to the "top" of the free list by moving the old free list pointer from the dummy to its link field and plugging its record number into the dummy as the new free list pointer. If, on the other hand, we need a record for an add, we use the record the free list pointer points to. How the free list pointer is updated depends on the link field of the record picked from the top of the list: if it was zero, we place the record's number plus 1 into the free list pointer; if it was nonzero, the link field is made the new free list pointer (that is, we follow the link of the record being removed from the free list to the next open record space, and make that the "top" of the free list.) If the free list pointer eventually has a negative "end of list" value plugged into it, the file is completely out of space, and deletions must be made, or the file expanded, before more records can be added.

If you've thoroughly read and digested the two parts of this article, you now understand linked list basic principles very well, and can apply them to creating more efficient file structures. For example, you could structure a file as a number of smaller linked lists, each with a separate pointer on the dummy; with this technique, you could partition a large, alphabetically keyed file into 26 linked lists, each with its own pointer--one for the A's, one for the B's, etc. Why? With this scheme, you can search for the "Murphy" record, for example, by reading only the "M" chain, thereby avoiding the necessity of reading Abramson's, Baker's, and Cook's records to find it; obviously, this will lead to much reduced processing time on the average.

Because this installment's material is derived rather straightforwardly from the material presented in Part I, I have chosen not to include BASIC listings covering the new ground we've explored. Nevertheless, I'd be more than happy to answer any questions you may have about linked list concepts in a future edition of ColorCue.

## **SOFTWARE EXPLAINED**

### The Personal Data Base

A lot of you who know what a Data Base is have been waiting anxiously for ours to come out. And a lot of you who don't know what a Data Base is have been asking 'What's it for?' The Personal Data Base is almost ready for release. We are in the process of reviewing the documentation to make sure it's complete and easy to use. We expect the Sof-Disk album to be shipped starting May 15.

A 'Data Base' is a computer system that allows the user to store data that is arranged as a number of different entries that have the same form. For example, if you were to record a list of addresses, you would see that although each individual piece of information is different, each address is written in approximately the same form as all other addresses. The data base allows you to specify a format for entering data. Once the data is stored, you can retrieve it, print it, update it, or change it as you choose.

Most businesses use some kind of data base to store their records. Here at Compucolor Corporation, we use a data base system to keep track of employees, print shipping labels, keep our dealer's addresses current -- the data base is what we use to store and print the labels for ColorCue! Until recently, data bases were only available on very large computers, but technological advances in the last few years have permitted implementation of data bases on microcomputers. The COMPUCOLOR II's Personal Data Base is intended primarily for use in the home. As you experiment with it, you will find many ways to make it useful. You can keep track of your personal library; create a household inventory for insurance purposes; or put your address book on the computer. A Sof-Disk is a much more convenient method of storage than the loose papers and lists it replaces.

The Data Base is easy to learn to use. For each kind of data you want to store, you set up a new data storage format. Once this format is recorded, it is a simple matter to enter existing data in response to the program's prompts. When you specify the data format, you tell the program how many characters will be in each line of information, and how many lines of information you will save for each record. A set-up for a list of addresses might look like this:

NAME	A 25
ADDRESS	A 25
CITY	A 15
STATE	A 5
ZIP	A 7

The 'A' indicates that the entry will be alphanumeric. You can use 'N' to specify numeric fields. When the format is entered, you can choose the number of records you will store on the disk, and then you enter all of the information that was previously stored on paper. While you are doing the entry, the Data Base program has many convenient features that allow you to see at a glance how many records you have entered, whether or not a name is already in the file, how much space is left on the disk, and much more. The Data Base allows you to update records (we use this to change expiration dates when ColorCue subscriptions are extended), make changes in your file, delete records, or see a quick listing of the first entry in all the records so far entered. Once your information is stored, you can print out information in any form you choose. You can sort by any one of the fields, and then print in any fashion you choose. Using the example above, you might want to sort by zip codes and then print labels in this form:

NAME  
ADDRESS  
CITY STATE ZIP

The Data Base will do all of this simply and automatically. Those of you who are using the COMPUCOLOR II for your businesses may find the Data Base useful for mailing lists, employee files, or inventories.

The Data Base will be shipped starting the second week of May, so place your orders now. Those of you who have already placed orders will receive your Sof-Disks in about two weeks. The price of the Data Base is \$29.95, and that includes a manual with detailed instructions for using it. You need 16K to use the program. Order part #990016.

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### Playing Cards

This month's SOFTWARE EXPLAINED column has a second feature. Many of you who are writing your own game programs have been searching through listings of our Sof-Disks to find programming techniques to help you. That's a good way to learn more about BASIC and to save yourself some time. Often you can incorporate routines that we have already devised into your own programs, or you can see an example of how to approach a specific problem. We've gotten several calls from users who want to use the playing cards that we have drawn for games like BlackJack, but it seems that the lines of code are hard to find. The following program shows you exactly how it's done.

```
100 REM HOW TO MAKE A CARD
200 REM THIS PROGRAM PRINTS THE THREE OF SPADES
500 PLOT 12,15
750 PRINT THE TOP EDGE OF THE CARD
1000 PLOT 6,7: REM SET FOREGROUND WHITE
1025 PLOT 29, 244: REM PRINT UPPER LEFT CORNER
1050 PLOT 6,56: REM SET BACKGROUND WHITE
1075 FOR I=0 TO 8: REM PRINT INTERIOR OF UPPER EDGE
1100 PLOT 32
1125 NEXT
1150 PLOT 6,7: REM SET FOREGROUND WHITE
1175 PLOT 245: REM PRINT UPPER RIGHT CORNER
1200 PRINT
1500 REM PRINT INTERIOR OF CARD (BLANK)
2000 PLOT 6,56
2025 FOR I=0 TO 11
2050 PRINT"           ":REM (11 SPACES)
2075 NEXT
2500 REM PRINT THE BOTTOM EDGE OF CARD
3000 PLOT 6,7: REM SET FOREGROUND WHITE
3025 PLOT 29,246: REM LOWER LEFT CORNER
3050 PLOT 6,56: REM PRINT INTERIOR BOTTOM EDGE
3075 FOR I=0 TO 8: REM PRINT INTERIOR OF BOTTOM EDGE
3100 PLOT 32
3125 NEXT
3150 PLOT 6,7:REM SET FOREGROUND WHITE
3175 PLOT 247:REM PRINT LOWER RIGHT CORNER
3200 PRINT
```

```
3225 PLOT 6,56:REM SET BACKGROUND WHITE
3500 REM PRINT FACE OF THE CARD
4000 PLOT 3,0,1: PRINT 3: REM PRINT PIPS (3)
4025 PLOT 3,8,12: PRINT 3
4050 PLOT 3,1,2,243: REM PRINT SMALL SUIT SYMBOLS
4075 PLOT 3,9,11,243
4100 PLOT 14: REM SET LARGE CHARACTER SIZE
4125 PLOT 3,5,2,243: REM PRINT LARGE SUIT SYMBOLS
4150 PLOT 3,5,6,243
4175 PLOT 3,5,10,243
4200 PLOT 15,6,2: REM RESET SMALL CHARACTERS AND GREEN FOREGROUND
4225 PRINT:PRINT:PRINT
5000 END
```

This program is very easy to understand, -- even beginners can follow the well-commented code. You can use this program as a pattern for drawing other cards, or as a start for developing a program that will deal and draw random cards.

## COMMENTS AND CORRECTIONS

An interesting occurrence in California led us to the discovery of a bug in the Biorhythms program. An 82 year-old man walked into Peninsula Office Supply (one of our dealers in California) and started to play with the COMPUCOLOR II. When he ran the Biorhythms program, and it told him the day of his birth, he insisted that the machine was wrong. Luc Serriere, Peninsula's manager, was not sure what to think. He had used the program many times and knew that if the COMPUCOLOR II says you were born on a Saturday, you **were** born on a Saturday! Closer inspection disclosed that the program adjusts for leap years only every four years. You probably know that at the end of every year, an extra portion of a day accumulates, which is equal to slightly less than 1/4 day. The formula for correcting for the extra portion of a day that collects at the end of every year is to add one day:

once every four years  
except every 100 years  
except every 400 years  
except every ...

Because the man's birthday fell before 1900, the program had added an extra day to his life! It had failed to make the 'except every 100 years' correction, and had counted February 29, 1900 (a day that never existed) as part of the man's life. Can anyone suggest a line to insert in Biorhythms to correct this?

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Many of you have requested information about adding memory to your machines. If you have an 8K machine and wish to update to 16K, you must send us the logic board. The cost is \$300 (plus 5% shipping and handling). Ask for part # 100964 (16K Logic Assembly). But check with your dealer first. He may be able to do it right at his store. If you wish to update from 8K to 32K, you must first have your COMPUCOLOR II updated to 16K, and then the 16K add-on RAM can be installed. The total price for this

expansion is \$600. Those of you who have 16K machines can add another 16K simply and easily with the piggyback RAM which costs \$400. You do not need to send anything to us. Just order part #100986 and it can be quickly installed. Again, check with your dealer. Many dealers have these parts in stock and can expand your memory in just a few minutes!

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Last month's issue contained information about a half-tone character for producing color shadings. We referred to it as the 'null' character, which it is. But, we told you that it could be formed with the DELETE key, which it cannot. The key labelled 'NULL @' is the 'checkerboard' key.

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We appreciate all the **terrific** letters we've been getting from our readers across the country. We are sorry for the delay in responding to your letters, but they are all answered personally by the ColorCue staff, and it takes us a little while! Your comments and suggestions, as well as your words of encouragement and praise, help make ColorCue a responsive newsletter. We try to work in your requests for articles, and hope we are meeting your needs. If you have an idea, an article to send in, a suggestion, or just a question, write to us at:

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